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LETTER REPORT REGARDING FIRST QUARTER MONITORING REPORT ADDENDUM FOR
SOLID WASTE MANAGEMENT UNITS 6 AND 7 TREATABILITY STUDY NS MAYPORT FL

10/10/2003

TETRA TECH NUS



TETRA TECH NUS, INC.

8640 Philips Highway, Suite 16 • Jacksonville, FL 32256
Tel 904.636.6125 • Fax 904.636.6165 • www.tetrattech.com

Document No. 04JAX0002

October 10, 2003

Project Number N4259

Commander, Southern Division
Naval Facilities Engineering Command
ATTN: Adrienne Wilson (Code ES31)
2155 Eagle Drive
North Charleston, South Carolina 29406

Reference: CLEAN Contract Number N62467-94-D-0888
Contract Task Order Number 0253

Subject: First Quarter Monitoring Report Addendum for
Solid Waste Management Units (SWMUs) 6 & 7 Treatability Study
Naval Station (NS) Mayport, Mayport, Florida.

Dear Ms. Wilson:

Tetra Tech NUS, Inc. (TtNUS) is pleased to submit the First Quarter Monitoring Letter Report Addendum for the subject site. This report was prepared for the United States Navy (Navy) Southern Division, Naval Facilities Engineering Command under Contract Task Order (CTO) 0253 for the Comprehensive Long-term Environmental Action Navy (CLEAN) Contract Number N62467-94-D-0888. This letter report is an addendum to the First Quarter Monitoring Report for SWMUs 6 & 7 issued on August 12, 2003. This addendum provides an initial Natural Attenuation (NA) site score for SWMUs 6 & 7 based on the first quarter analytical results. The first quarter NA sampling events were conducted in November and December 2002 and January 2003. The initial NA site scoring for SWMUs 6 & 7 from the first quarter groundwater sampling events is presented herein.

NA Site Scoring

The Draft United States Environmental Protection Agency (USEPA) Region 4 Suggested Practices for Evaluation of a Site for Natural Attenuation (Biological Degradation) protocol was used to create a NA score card for SWMUs 6 & 7. Groundwater sampling and on-site analysis were conducted as suggested by the USEPA NA guidance document. Ten groundwater monitoring wells were sampled and analyzed monthly for field and laboratory NA parameters during the first quarter. Results of the on-site as well as off-site groundwater analysis were provided in the First Quarter Monitoring Report in Table 3 and Table 4.

Groundwater temperature, pH, oxidation-reduction potential (ORP), and conductivity were measured during the purging of monitoring well for sampling. Field measurement of alkalinity, carbon dioxide (CO₂), dissolved oxygen, ferrous iron, hydrogen sulfide, and sulfide were collected following groundwater purging using field test kits. Groundwater samples were also collected and shipped to two fixed-based laboratories for iron, manganese, alkalinity, ammonia, chloride, total organic carbon (TOC), nitrate, orthophosphate, sulfate, CO₂, ethane, ethene, hydrogen, methane, nitrogen, and oxygen analysis.

To determine a score that indicates the likelihood of biodegradation, a specific numerical value is assigned to each parameter listed in the USEPA NA guidance document. The numbers for all parameters are then added up for a total score that indicates the potential of the site to support NA through biodegradation. For example, if pH is less than 5 or greater than 9, then a reductive pathway is unlikely and a score of -2 is



assigned; if it is the optimal range ($5 < \text{pH} < 9$), then a reductive pathway is possible and a numerical value of 0 is assigned. Possible values for all other parameters are listed below:

<u>Parameter</u>	<u>Scoring</u>
Alkalinity	1 if 2 times background
CO ₂	1 if 2 times background
Chloride	2 if 2 times background
Dissolved oxygen	3 if less than 0.5 milligrams per liter (mg/L); -3 if greater than 1.0 mg/L
Ethane/Ethene	2 if greater than 0.01 mg/L; 3 if greater than 1 mg/L
Ferrous iron	3 if greater than 1 mg/L
Hydrogen	3 if greater than 1 nanomoles (nM)
Methane	3 if greater than 0.5 mg/L
Nitrate	2 if less than 1 mg/L
ORP	1 if less than 50 millivolts (mV); 2 if less than -100 mV
pH	-2 if less than 5 or greater than 9
Sulfate	2 if less than 20 mg/L
Sulfide	3 if greater than 1 mg/L
Temperature	1 if greater than 20 degrees Celsius (°C)
TOC	2 if greater than 20 mg/L

Once all parameters have been assigned a numerical value, the values for all parameters from each monitoring well are summed for a total score. The total score is then indicative of the potential for biodegradation to be occurring. Below is a list of total scores and the associated potential for biodegradation to be occurring.

<u>Total Score</u>	<u>Interpretation</u>
0 to 5	Inadequate evidence for biodegradation
6 to 14	Limited evidence for biodegradation
15 to 20	Adequate evidence for biodegradation
Greater than 20	Strong evidence for biodegradation

A score sheet for the ten groundwater monitoring wells that were sampled during the December 2002 sampling event is provided as Table 5. December was arbitrarily chosen out of the three sampling events for the first quarter because it was the middle sampling event. Table 5 lists analytical parameters for each of the 10 groundwater monitoring wells sampled along with a numerical score for each parameter. A total score for each monitoring well was then calculated. Groundwater monitoring well MW19S was used as the clean up-gradient well to obtain background levels for alkalinity, CO₂, and chloride for this site.

The NA score card for groundwater monitoring well MW04S showed strong evidence of biodegradation. Monitoring wells MPT-8-MW03S, MW16S, and MW17S had scores that indicated adequate evidence of biodegradation. These four groundwater monitoring wells were all located in areas where free-product had been detected in the past. Monitoring wells MW09S, MW18S, and MPT-S-MW02S are down-gradient of the site and received NA scores that indicate limited evidence of biodegradation. It must be noted that pH values were approximately 3 units higher in December and it was noted in the field that the water quality meter used to record pH was not functioning properly. This potentially affects the results by adding 2 more points to the score of each of these wells, resulting in these well displaying adequate evidence of biodegradation. Two other wells (MW06S and MW01S) showed limited evidence of biodegradation and are located cross-gradient and up-gradient, respectively, to the impacted area. Monitoring well MW19S (clean up-gradient well) showed no evidence of biodegradation.



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Conclusion

Groundwater monitoring wells located within areas of known groundwater contamination received NA scores between 18 and 20 indicating adequate to strong evidence of biodegradation. Monitoring wells outside the known area of impacted groundwater showed limited evidence of biodegradation with NA scores ranging between 6 and 13.

If you have any questions with regard to this submittal, please contact me at (850) 385-9899 or via e-mail at hansent@ttnus.com.

Sincerely,

Charles Hansen for

Terry Hansen P.G.
Task Order Manager

TH/cm

Attachments (5)

- c: Mr. J. Cason P.G., FDEP (2 copies)
Mr. C. Benedikt, USEPA
Ms. C. Mitchell, NAVSTA Mayport
Ms. D. Lancaster, NAVSTA Mayport
Mr. M. Halil P.E., JA Jones
Mr. M. Albert P.E., TtNUS
Ms. D. Wroblewski, TtNUS (cover letter only)
Mr. M. Perry, TtNUS (unbound copy)

TABLES

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Analysis	Background Reading	MPT-8-MW01S		MPT-S-MW02S		MPT-8-MW03S		MPT-8-MW04S		MPT-8-MW-06S	
		Concentration	Score	Concentration	Score	Concentration	Score	Concentration	Score	Concentration	Score
Alkalinity (mg/L)	170	170	0	380	1	510	1	280	0	190	0
Carbon Dioxide (mg/L)	4	11 J	1	51 J	1	160 J	1	150 J	1	9.9 J	1
Chloride (mg/L)	24	16	0	420	2	17	0	16	0	7.7	0
Dissolved Oxygen (mg/L)		0.8	0	1.0	0	0.25	3	0.2	3	5	-3
Ethane (mg/L)		0.00002 J	0	0.00025 J	0	0.000053 J	0	0.00013 J	0	--	0
Ethene (mg/L)		--	0	--	0	--	0	0.00001 J	0	--	0
Ferrous Iron (mg/L)		0.13	0	0.06	0	0.4	0	4.3	3	0.01	0
Hydrogen (nM)		1.1 J	3	1.1 J	3	3.6 J	3	2.2 J	3	1.2 J	3
Methane (mg/L)		0.12 J	0	2.1 J	3	5.2 J	3	7.5 J	3	0.00008 J	0
Nitrate (mg/L)		--	2	0.18	2	--	2	--	2	0.44	2
ORP (mV)		-162	2	-160	2	-313	2	-175	2	87	0
pH (SU)		11.13	-2	10.36	-2	12.05	-2	10.12	-2	8.49	0
Sulfate (mg/L)		29	0	32	0	18	2	3	2	15	2
Sulfide (mg/L)		0.05	0	0.04	0	>0.80	3	0.23	0	0	0
Temperature (°C)		22.97	1	23.14	1	24.12	1	24.99	1	22.42	1
Total Organic Carbon (mg/L)		NA	0	13	0	NA	0	30	2	1.1	0
Total Score:			7		13		19		20		6

Total Score	Interpretation
0 to 5	Inadequate evidence of biodegradation
6 to 14	Limited evidence of biodegradation
15 to 20	Adequate evidence of biodegradation
> 20	Strong evidence of biodegradation

See notes at end of table.

TABLE 5 (CONTINUED)
SUMMARY OF ANALYTES DETECTED IN GROUNDWATER - SWMUs 6 & 7
DECEMBER 2002 SAMPLING EVENT
NAVAL STATION MAYPORT, MAYPORT, FLORIDA

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Analysis	Background Reading	MPT-8-MW09S		MPT-8-MW16S		MPT-8-MW17S		MPT-8-MW18S		MPT-8-MW19S	
		Concentration	Score	Concentration	Score	Concentration	Score	Concentration	Score	Concentration	Score
Alkalinity (mg/L)	170	370	1	510	1	350	1	230	0	170	0
Carbon Dioxide (mg/L)	4	72 J	1	180 J	1	68 J	1	13 J	1	4 J	0
Chloride (mg/L)	24	190	2	20	0	13	0	9.1	0	24	0
Dissolved Oxygen (mg/L)		1	0	0.8	0	0.4	3	1	0	4	-3
Ethane (mg/L)		0.000011 J	0	0.00013 J	0	--	0	--	0	--	0
Ethene (mg/L)		--	0	--	0	--	0	--	0	--	0
Ferrous Iron (mg/L)		0.98	0	4	3	2.61	3	1.17	3	0.03	0
Hydrogen (nM)		1.6 J	3	3.5 J	3	1.3 J	3	1.4 J	3	1 J	3
Methane (mg/L)		0.340 J	0	7.4 J	3	0.610 J	3	0.068 J	0	0.0002 J	0
Nitrate (mg/L)		0.16	2	0.12	2	--	2	--	2	1.5	0
ORP (mV)		-97	1	-120	2	-182	2	-206	2	98	0
pH (SU)		10.34	-2	10.39	-2	10.41	-2	11.26	-2	8.11	0
Sulfate (mg/L)		20	2	14	2	13	2	15	2	33	0
Sulfide (mg/L)		0.01	0	0.06	0	0.09	0	0.01	0	0.01	0
Temperature (°C)		23.45	1	24.41	1	24.09	1	24.1	1	18.4	0
Total Organic Carbon (mg/L)		15	0	22	2	6.3	0	NA	0	4.8	0
Total Score:			11		18		19		12		0

<u>Total Score</u>	<u>Interpretation</u>
0 to 5	Inadequate evidence of biodegradation
6 to 14	Limited evidence of biodegradation
15 to 20	Adequate evidence of biodegradation
> 20	Strong evidence of biodegradation

Notes:

J = Compound detected at an estimated concentration

-- = Compound not detected

mg/L = Milligrams per liter

NA = Not analyzed

nM = Nanomoles

SU = Standard units

mV = Millivolts